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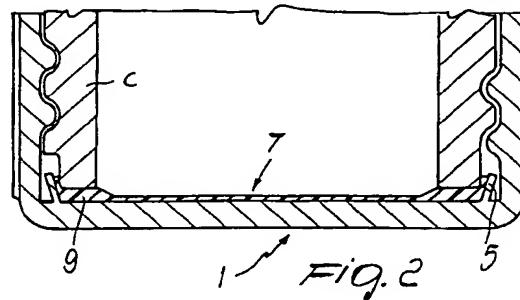
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### (54) Plastic screw cap for closing containers

(57) A plastic screw cap for closing a container, including a cup (1) composed of a disk-like portion (2) and a cylindrical wall (3) that protrudes from the rim of said disk-like portion (2) and has an internal thread (4) that is adapted to engage a corresponding thread of the container, the cap further comprising an annular lip (5,12,13,15) that protrudes from the disk-like portion (2) concentrically with respect to the cylindrical wall (3), the annular lip (5,12,13,15) acting as a shoulder for a sealing liner (7,16), so that the liner (7,16), when the cap has been applied to the container, frontally and externally engages the rim of the mouth of the container.



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## Description

The present invention relates to a plastic screw cap for closing containers.

Screw caps of this type are already commercially available.

They generally comprise a cup composed of a cylindrical wall that protrudes from the peripheral region of a disk-like portion adapted to close the mouth of the container. On the inside of the cylindrical wall there is provided a thread adapted to engage, by screwing, a corresponding thread of the container.

A tamper-evident ring is coupled to the rim of the cup by means of breakable bridges and has means for engaging a collar of the container. When the cap is unscrewed, the ring abuts against said collar, breaking the bridges and clearly indicating that the container has been tampered with owing to the fact that the ring remains coupled below the collar.

In order to ensure hermetic closure of the container, on the inner face of the disk-like portion there are provided sealing means, against which the rim of the mouth (so-called "finish") of the container acts. Said sealing means are substantially of three types. A first type consists of a disk-like liner made of an adapted material that is applied so as to cover the inner face of the disk-like portion. A second type is constituted by a liner that is formed by molding directly inside the cup. An example of a liner of this second type is disclosed in US patent no 4,378,893. This patent also discloses an annular lip that protrudes inwards from the cylindrical wall of the cup proximate to the disk-like portion and retains the peripheral rim of the molded liner.

Finally, a third type of sealing means is constituted by one or more flexible annular lips that protrude concentrically towards the inside of the disk-like portion and adhere to the finish of the container. A closure of this type is described in European patent no. 162,456.

Sealing means that are currently in use have some substantial drawbacks. The sealing means of the first type require the preliminary formation, in auxiliary machines, of the disks to be applied inside the cups, entailing additional operating cycles. The sealing means of the second type require special molds to form the annular lip as an undertuck.

The sealing means of the third type often have insufficient tightness characteristics, since the concentric rings are made of the same material as the cup and are therefore not flexible enough to eliminate all the unevennesses of the finish.

A principal aim of the present invention is to provide a plastic screw cap that allows to overcome the shortcomings of conventional ones, i.e., is capable of ensuring a high level of tightness and low-cost production.

This aim is achieved with a plastic screw cap for closing a container that comprises a cup composed of a disk-like portion and a cylindrical wall that protrudes from the rim of said disk-like portion and has an internal thread that is adapted to engage a corresponding

thread of the container, characterized in that it comprises an annular lip that protrudes from said disk-like portion concentrically with respect to said cylindrical wall, said annular lip acting as a shoulder for a sealing liner, so that said liner, when the cap has been applied to the container, frontally and externally engages the rim of the mouth of the container.

Further characteristics and advantages of the cap according to the invention will become apparent from the following detailed description of some embodiments thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

- 15 figure 1 is a sectional view of a cap;
- figure 2 is a sectional view of the cap of figure 1, in the position in which the container is closed;
- figures 3, 4, and 5 are sectional views of some different embodiments of the cap;
- 20 figure 6 is a sectional view of the cap of figure 5 in the position in which the container is closed;
- figure 7 is a sectional view of a further different embodiment of the cap; and
- 25 figure 8 is a sectional view of the cap of figure 7 in the position in which the container is closed.

With reference to figure 1, the cap comprises a cup, generally designated by the reference numeral 1, which comprises a disk-like portion 2 from which a cylindrical wall 3, having an internal thread 4, protrudes.

An annular lip 5, coaxial to the cylindrical wall 3, protrudes from the peripheral region of the disk-like portion 2 inside the cap. The diameter of the lip 5 is greater than the smallest diameter of the thread 4, so that the lip 5 lies within the space occupied axially by the thread but is separated from the wall 3 by an annular slot 6.

The cup 1 is formed by molding plastics, for example polypropylene, polyethylene, or copolymers thereof.

The liner 7 is applied inside the annular lip 5 to hermetically close the mouth of the container on which the cap is to be screwed.

The liner 7 comprises a central thinner region 8 that covers the inner face of the disk-like portion 2. The central region 8 is surrounded by an annular enlarged portion 9 having, proximate to the lip 5, a flat region 10, from which the thickness increases radially outwards to blend with the lip 5 with a bead 11 having a substantially triangular cross-section.

By virtue of said bead 11 and of the presence of the peripheral slot 6, when the cap is applied to the container C the resulting axial thrust widens the annular lip 5, allowing the bead 11 of the liner to externally wrap around the rim of the mouth of the container, whilst said rim is pressed frontally against the flat region 10.

This eliminates front tightness problems arising from any camber of the disk-like portion caused by an increase in the internal pressure of the container. Likewise, the external covering of the rim of the container provided by the bead 11 allows to ensure the tightness of the closure even in case of variations in the diameter

of the mouth of the container.

Figure 3 is a view of a first different embodiment, which differs from the solution shown in figures 1 and 2 owing to the fact that the outside diameter of the annular lip 5 is smaller than the inside diameter of the thread. This solution allows to reduce the stresses on the cap that occur during extraction of the internal molding plunger at the end of the cap molding step.

Figure 4 is a view of a second different embodiment, which provides for an annular lip 12 that converges inwardly to ensure peripheral containment of the liner both during liner molding and when the cap is in the position for closing the container.

Likewise, the solution of figures 5 and 6 provides for an annular lip 13 which is internally provided with an annular groove 14.

The lip 13 has such a thickness that when the cap is applied to the container it abuts externally against the inner face of the wall 3, providing a sealing thrust against the inner face of the wall 3 and providing a sealing thrust against the outer rim of the container.

Finally, figure 7 illustrates an embodiment that provides for an annular lip 15 that is similar to those of figures 1 and 2 but differs, with respect to said figures, because of the presence of a disk-like liner 16.

The liner 16 is inserted in the cap, where it is retained by an undertuck 17. In some cases, the undertuck is not necessary and the thread keeps the liner inserted.

When the cap is applied to the container, the rim of the mouth pushes the liner inside the annular lip, which provides the necessary radial sealing thrust by flexing.

Optional cusp-shaped protrusions 18 rising from the disk-like portion of the cup can be provided proximate to the annular lip 15 and, by engaging the liner, prevent it from moving radially once it has been applied to the bottle.

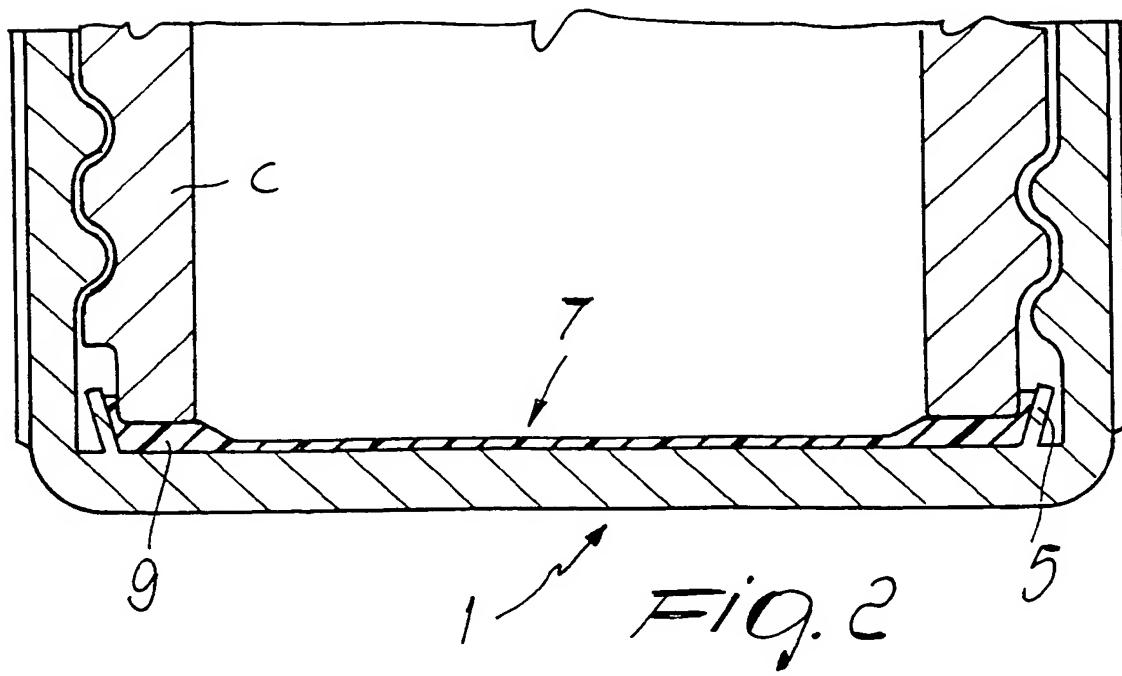
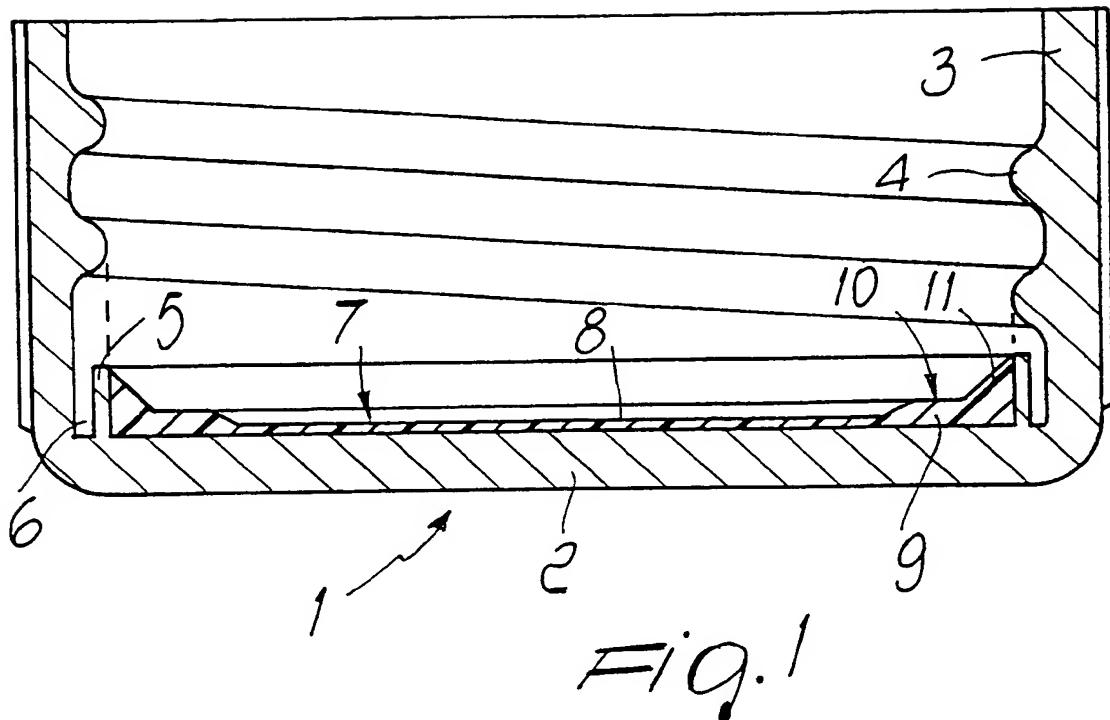
Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

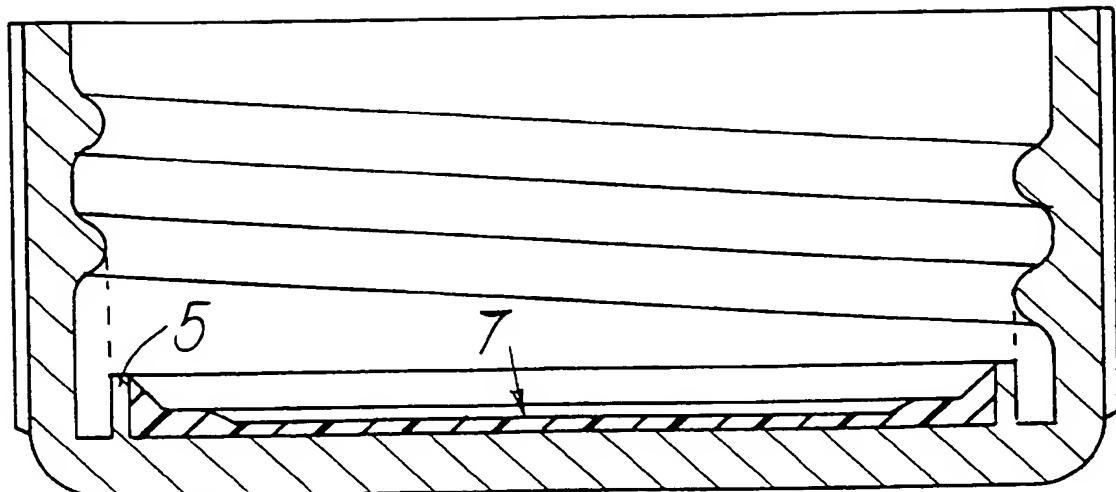
## Claims

- Plastic screw cap for closing a container, comprising a cup (1) composed of a disk-like portion (2) and a cylindrical wall (3) that protrudes from the rim of said disk-like portion (2) and has an internal thread (4) that is adapted to engage a corresponding thread of the container, characterized in that it comprises an annular lip (5,12,13,15) that protrudes from said disk-like portion (2) concentrically with respect to said cylindrical wall (3), said annular lip (5,12,13,15) acting as a shoulder for a sealing liner (7,16), so that said liner (7,16), when the cap has been applied to the container, frontally and

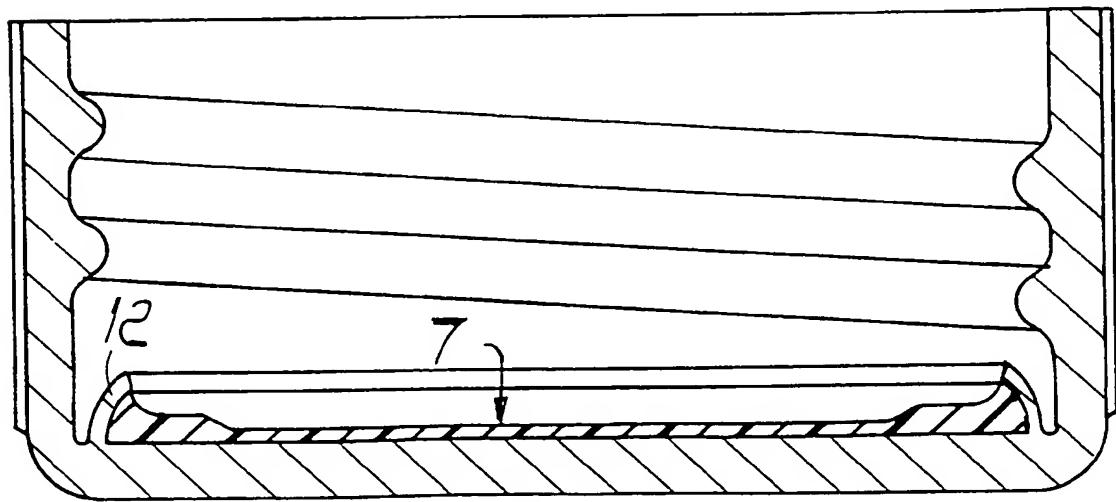
externally engages the rim of the mouth of the container.

- Screw cap according to claim 1, characterized in that said liner (16) is disk-shaped and is retained inside the cap by retention elements (17) that protrude from said cylindrical wall.
- Screw cap according to claim 2, characterized in that cusp-shaped protrusions (18) are provided in the disk-like portion (2) of said cup (1) and are adapted to engage in said disk-shaped liner (16).
- Screw cap according to claim 1, characterized in that said liner (7) is applied by molding inside said annular lip (5,12,13).
- Screw cap according to claim 4, characterized in that said liner (7) has a central thinner region (8) that covers the inner face of the disk-like portion (2), said central region (8) being surrounded by an annular enlarged portion (9) having, proximate to the annular lip (5), a flat region (10) around which a bead (11) is provided the thickness whereof increases radially outwards to blend with said annular lip (5).
- Screw cap according to one of claims 1 to 5, characterized in that said annular lip (5) has an inside diameter that is at least equal to the inside diameter of said thread (4) and forms a slot (6) together with said cylindrical wall (3).
- Screw cap according to one of claims 1 to 6, characterized in that said annular lip (5) has an outside diameter that is smaller than the inside diameter of said thread (4) and forms a slot (6) together with said cylindrical wall (3).
- Screw cap according to one of claims 3 to 6, characterized in that said annular lip (13) is internally provided with a groove (14) for containing the rim of the liner (7).
- Screw cap according to one of claims 3 to 8, characterized in that said lip (13) has such a thickness that when the cap is applied to the container it abuts externally against the inner face of said cylindrical wall (3).

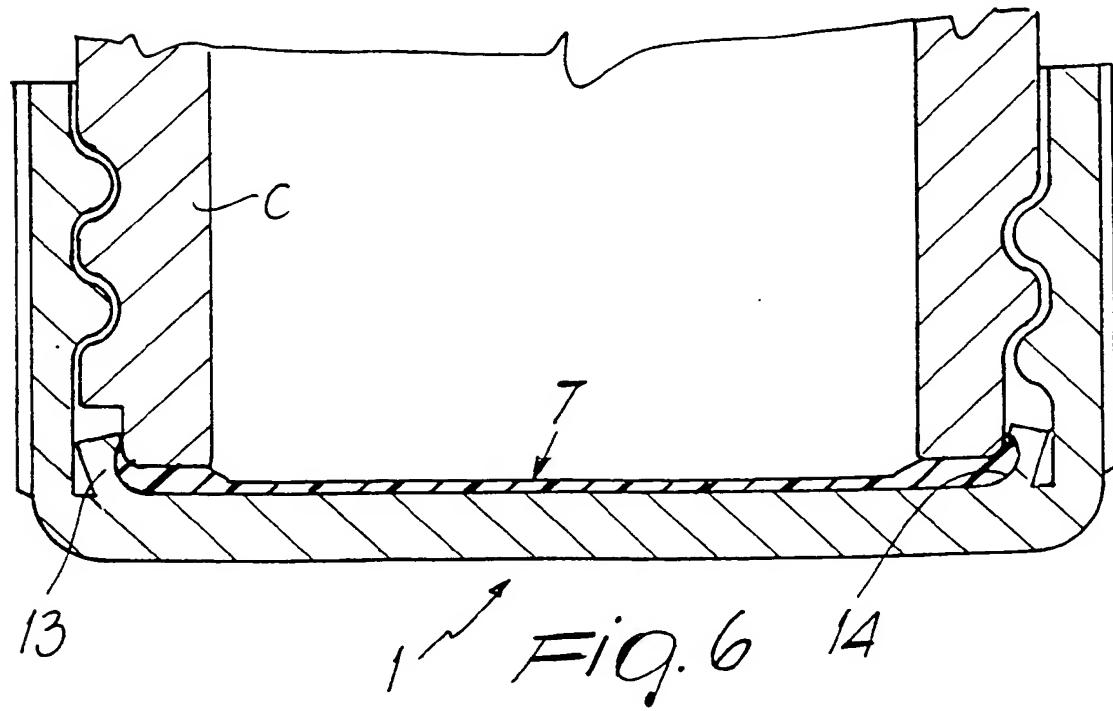
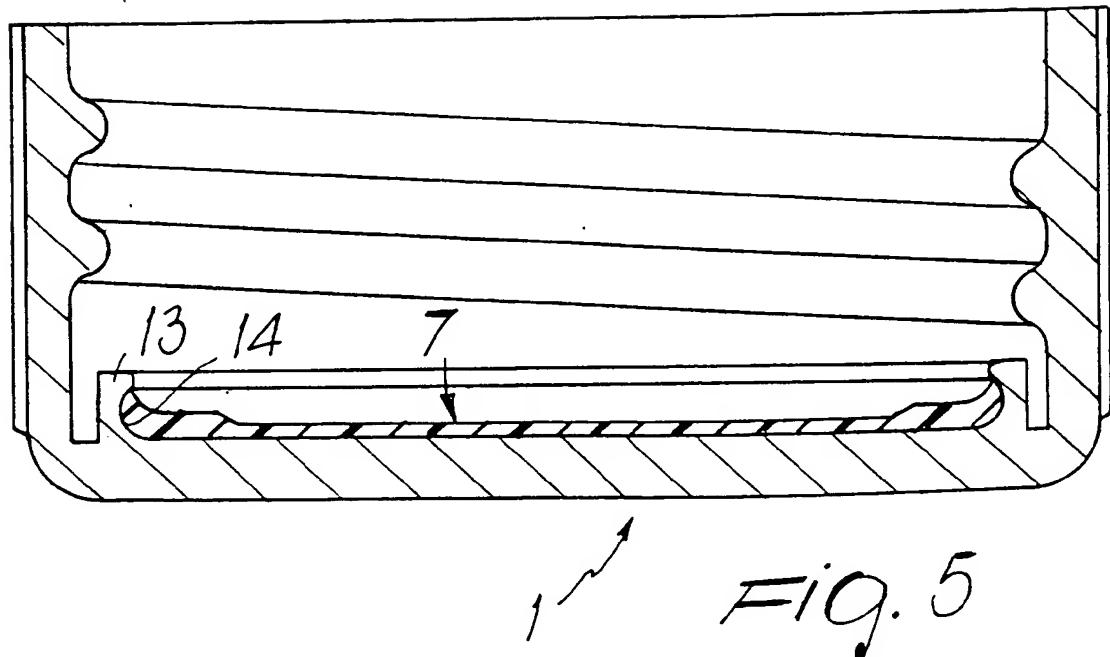


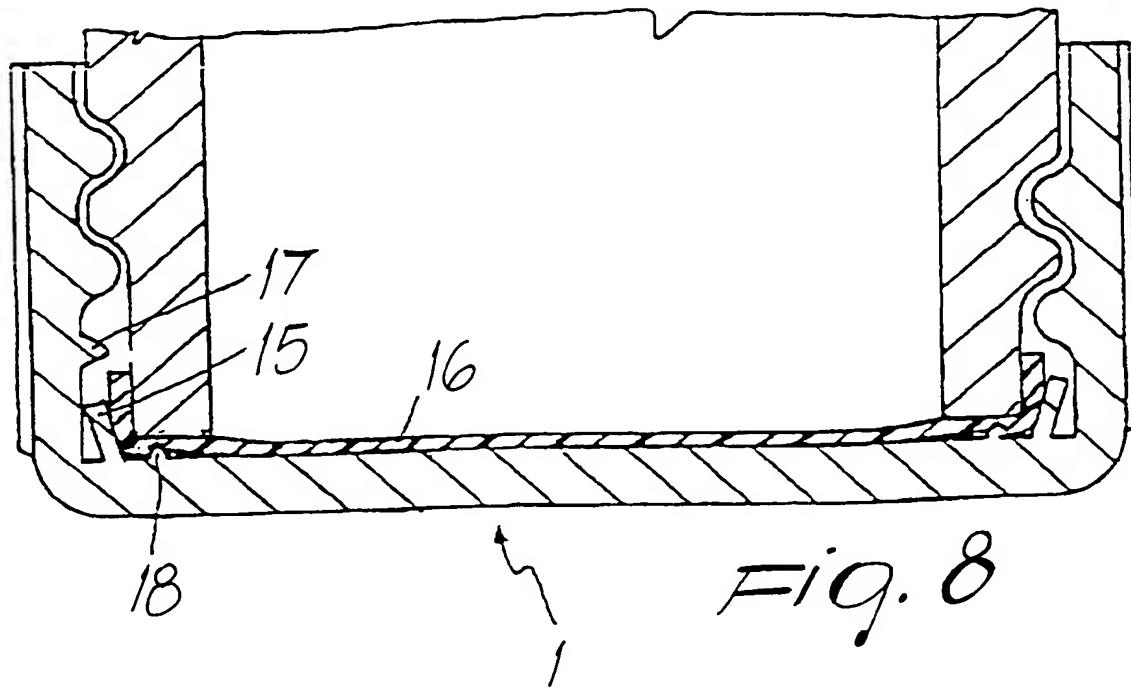
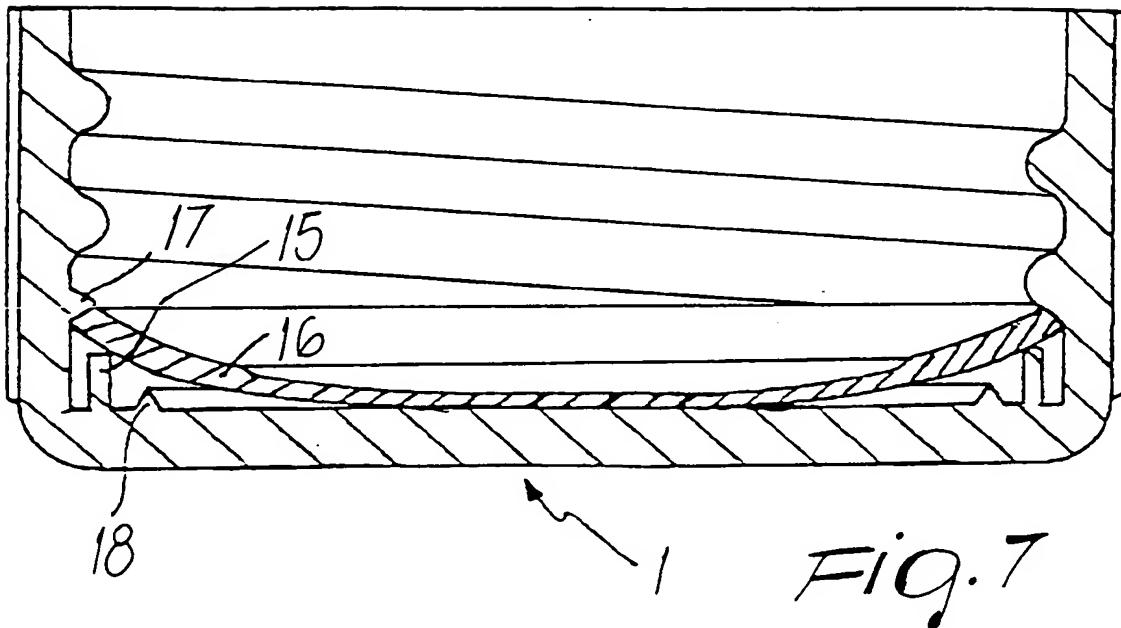


1 → FIG. 3



1 → FIG. 4







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## EUROPEAN SEARCH REPORT

Application Number  
EP 96 11 7008

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US-A-4 629 083 (DRUITT RODNEY M) 16 December 1986 * the whole document *	1,2,6,7	B65D41/04
Y	---	3-5,8,9	
Y	US-A-4 407 422 (WILDE SHELDON L ET AL) 4 October 1983 * column 3, line 34 - line 37; figure 1 *	3,8,9	
Y	---		
Y	US-A-3 022 918 (SMITH) 27 February 1962 * column 2, line 30 - line 38; figure 1 *	5	
Y	---		
Y	GB-A-2 108 892 (HC IND) 25 May 1983 * page 1, line 20 - line 35; figures *	4	
A	US-A-4 076 152 (MUMFORD GEORGE V) 28 February 1978 * column 1, line 26 - line 51; figures *	1-9	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65D
<p>The present search report has been drawn up for all claims</p>			
Place of search  BERLIN	Date of completion of the search  2 December 1996	Examiner  Olsson, B	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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